COMMUNICATION

S Y S T E M

CMU 100
Star coupler
FO multimode
to RS232 & RS485

CMU100 / 2.6.1.5-2.x & 2.6.2.5-2.x

Project	Communication devices
Device name	CMU100
Document	421304700026_v1-08_02_26-CMU100 star FO mm to RS232 & RS485.doc
Version	1
Author	Grega Flander
Date	26.02.2008
Reference document	-
Consultants	-
Approved by	Grega Flander
Code	421304700026
History	1 – first release

PREFACE

Liability statement

We have checked the contents of this manual to ensure that the descriptions of both hardware and software are as accurate as possible. However, deviations may occur so that no liability can be accepted for any errors or omissions contained in the information given.

The contents of this manual will be checked in periodical intervals, corrections will be made in the following editions.

We reserve the right to make technical improvements without notice.

Copyright

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Warnings

In this paper the following terms are used:

Danger

indicates that death, severe personal injury or substantial property damage will result if proper precautions are not taken.

Warning

indicates that death, severe personal injury or substantial property damage can result if proper precautions are not taken.

Caution

indicates that minor personal injury or property damage can result if proper precautions are not taken. This particularly applies to damage on or in the device itself.

General information

These paper contain the information that is necessary for the proper and safe operation of the described devices. This paper is intended for technically qualified personnel.

Warning!

Hazardous voltage is present inside the device during operation. Disregarding of safety rules can result in severe personal injury or property damage.

Only qualified personnel may work with described devices after being familiar with warnings and safety notices in this paper and other safety regulations.

Warning!

Device must operate completely assembled! Device must be used as described. No modifications of the device should be made.

Warning!

Do not open device while it is energized! Hazardous voltage is present inside the device. Disconnect all connectors before opening!

Warning!

If device is damaged disconnect it from power supply! Send it to the manufacturer for inspection.

CMU100 SYSTEM

Description

Communication unit (CMU100) is modular system of communication devices that can be used for various of tasks such as:

- communication converter (for example RS232 to RS485)
- star coupler (for example 1 fiber optic to 7 fiber optics)
- repeater (for example RS485/485)
- communication isolator (for example for communication between two devices on different voltage levels)
- communication listener - debugger
- PC serial com port extender (for example USB to 4 serial com)

CMU100 device is a couple of software and hardware. For different purposes, different software versions and different hardware configuration have been developed.

Software

Software is application dependent and allows different hardware configurations. Software's task is switching between communication ports and allows almost any combination between them.

Hardware

Hardware is based on main board with power supply and port switching logic. On that board, interface boards are attached. CMU100 can handle up to 8 different interface boards. Currently available interface boards:

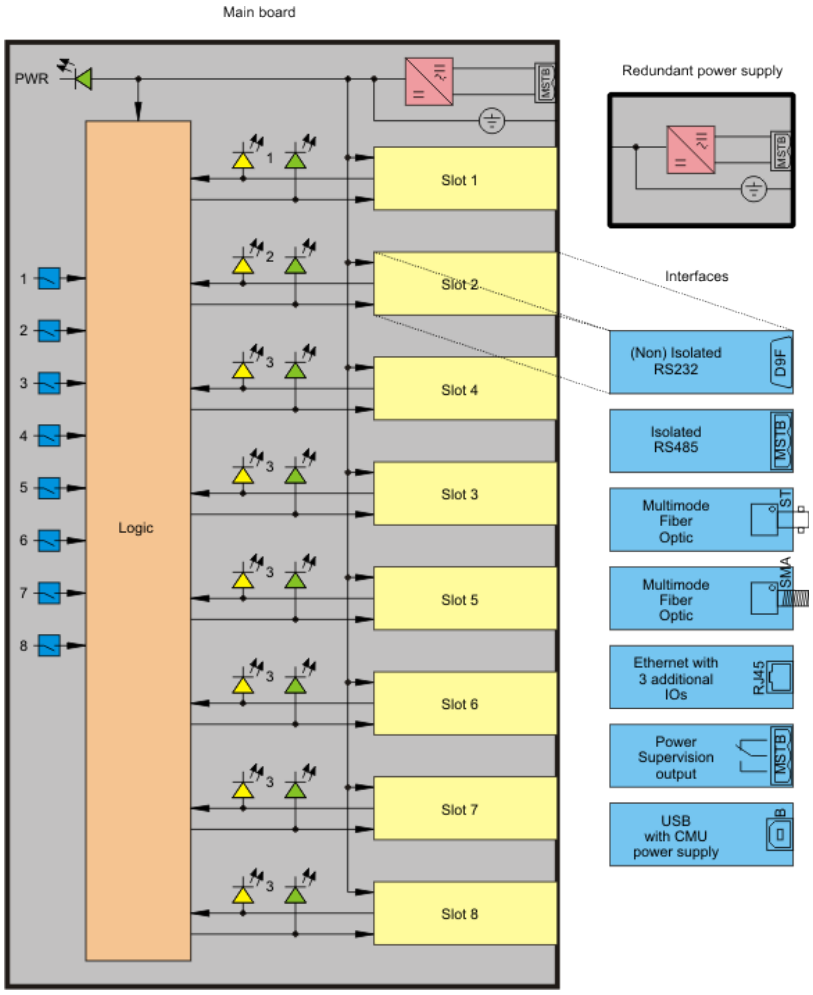
- (non)isolated RS232
- isolated RS485
- Multimode Fiber Optic ST and SMA connectors
- USB
- ethernet (with one virtual com port)
- power supply supervision with digital output

There is possibility to use additional redundancy power supply.

Housing is aluminium and intended for mount on standard DIN 35 rail (acc. to DIN EN 50022). 4 different housings have been made. Depends on how many interfaces device has, appropriate housing is used.

Hardware settings

All settings on the device can be made from outside by a DIL switch. It is not necessary to open the housing.



Picture 1: CMU100 system general diagram

FO MM to RS232 & RS485 STAR COUPLER

(TYPE CMU100 / 2.6.1.5-2.x & 2.6.2.5-2.x)

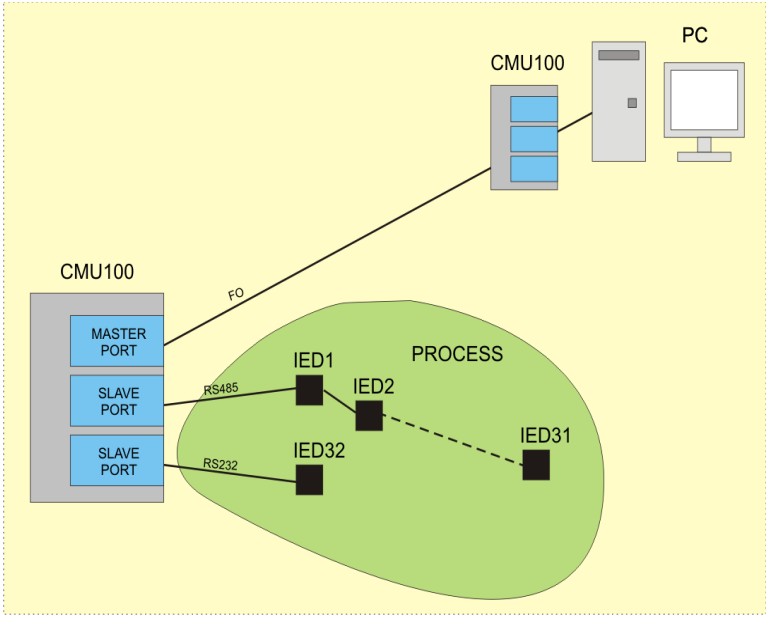
DESCRIPTION

Star coulpler is communication device that transfer data from one (master) to more than one port. Example is when we need access to one device with several PCs. With CMU system we can have one master and up to seven slave ports. Data is send from master port to all slave ports. On the other hand data from either slave port is send to master port only.

Communication node is device that transfers data from either port to all other ports.

All mentioned types of CMU100 devices can operate as star coupler or communiction node.

TYPICAL APPLICATION



Picture 2: CMU100 / 2.6.1.5-2.x & 2.6.2.5-2.**x** *star coupler typical application*

SOFTWARE DESCRIPTION

This software version (2.x) allows two modes of operations:

- star coupler with one master and two slave ports
  Master device (for example IED) is connected to CMU to master port (1). Other two CMU ports are slave ports (2,3) (connected for example to PCs) .
  Data flows from port 1 to ports 2 and 3. On return data flows from 2 or 3 port to port 1 only.
- simple three port communication node.
  Data flows from any port to other two ports.

In each mode echo can be set on each port.

Modes are set by switch 4:

- OFF – star coupler mode
- ON – communication node mode

Port switching matrix according to switch 4

	switch 4 OFF			switch 4 ON		
IN \ OUT	**1**	**2**	**3**	**1**	**2**	**3**
1	*	X	X	*	X	X
2	X	*		X	*	X
3	X		*	X	X	*

- X – active
- * - active when echo on incoming data port is ON

HARDWARE DESCRIPTION

This configuration of device is made from main board (power supply, switches and logic switch), and three RS232 port boards.

MAIN BOARD

Main board can handle up to 8 in and up to 8 out lines. That means up to 8 ports with (one) Rx and (one) Tx line can be used. If port with more input or/and output lines is used number of ports is reduced. For example if port with Rx, Tx, CTS and RTS lines is used up to 4 ports can be adopted in the system used.

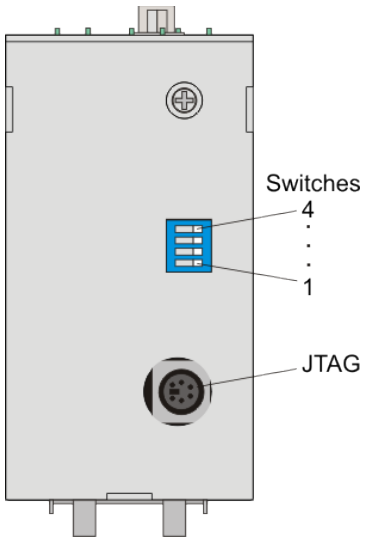
The right LEDs of one port shows activity on receive (Rx) line and the lower one shows activity on transmit (Tx) line.

On the bottom side of device are switches and JTAG connector which is intended for downloading necessary software. Do not connect anything to that connector.

Switches

Switch	**1**	**2**	**3**	**4**
Description	Echo port 1	Echo port 2	Echo port 3	Device mode
Position OFF	Echo off	Echo off	Echo off	Star coupler
Position ON	Echo on	Echo on	Echo on	Comm. node
Default position	OFF	OFF	OFF	OFF

Bottom view



Picture 3: CMU100 bottom view

Configuration of ports

Port	1	2	3
Interface	FO MM	RS232	RS485

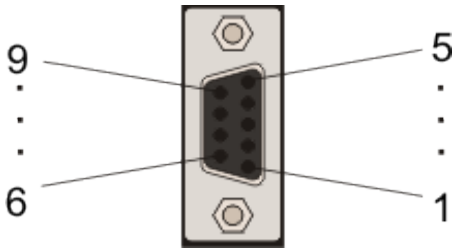
RS232 INTERFACE BOARD

Description

Single, galvanically (non)isolated, full duplex, RS232 port with DB9 female connector. Supported Rx, Tx and GND pins.

Connector pin table

DB9 F	2	3	5
Description	RX	TX	GND
Direction	IN	OUT	-



Picture 4: DB9 F connector outlook

Cable

CMU100 / RS232 to PC / RS232

CMU100		Direction	PC	
DB9 F pin	Signal		Signal	DB9 F pin
2	RX	<-------	TX	3
3	TX	------->	RX	2
5	GND	<------->	GND	5

RS485 INTERFACE BOARD

Description

Single, galvanically isolated, half duplex, RS485 port with Phoenix 3 pin screw connector. Automatic switch to receive after end of transmission with additional terminating and stabilizating resistors.

Hardware settings

For proper functioning of that board some settings must be done:

- board address
- RS485 bus termination and stabilisation
- baud rate

RS485 bus termination and stabilisation

TERMINATION

At high transmission rates or long distance, RS485 bus termination is necessery.

The termination on RS485 bus must be set on both ends of the RS485 bus.

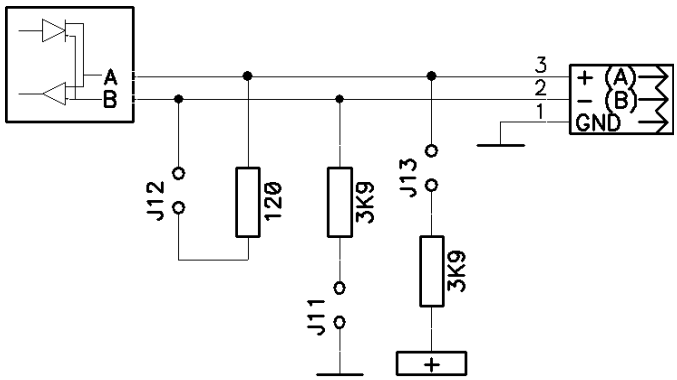
STABILISATION

Some device, to work properly, demands that RS485 must always be in known and valid state. That is, when + (positive) pin is more than 200 mV positive than – (negative) pin. Pins + and – are sometimes marked as A and B. In case that no device on RS485 bus is transmitting or in case of short circuit, there is no voltage difference between those pins and some device do not work correctly.

On this port board so called „true fail-safe“ RS485 chip is used so board works correctly without stabilisation at invalid RS485 bus state. But still switches for stabilisation are provided on port board. **The stabilization on RS485 bus may be set on one device only!**

Switches at the lower side of connector:

Switch	1 (J13)	2 (J12)	3 (J11)
Description	RS485 stabilisation	RS485 termination	RS485 stabilisation



Picture 5: RS485 BUS schematic

Switches at the upper side of connector:

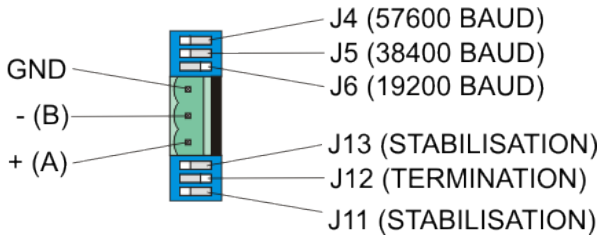
Baud rate

Switch	1 (J4)	2 (J5)	3 (J6)
Description	57600 BAUD	38400 BAUD	19200 BAUD

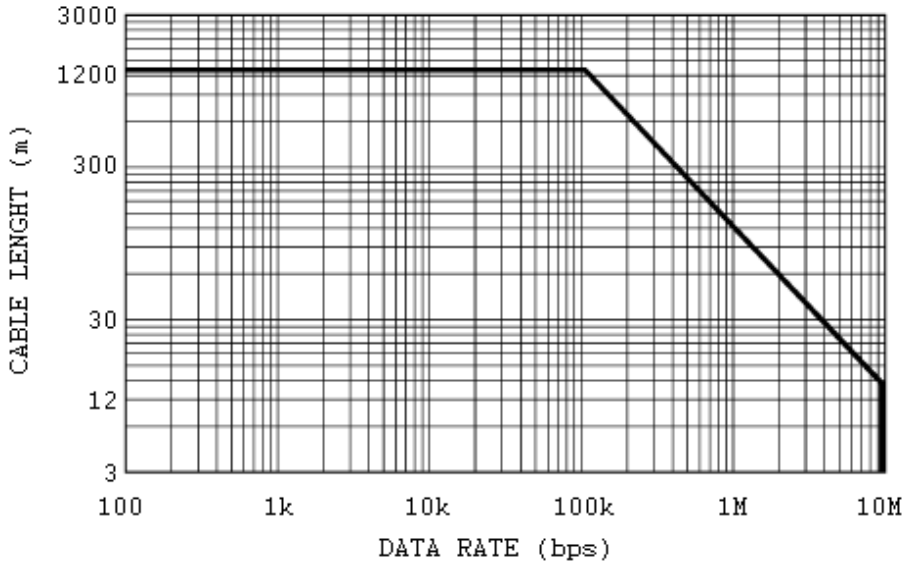
BAUD rate setting 19k2 (bps) is valid for all standard communication protocols, that do not request special timings. If special protocols (small request-respond time required) are used please note it in order.

Connector pin table

MSTB	1	2	3
Description	GND	- (B)	+ (A)



Picture 6: RS485 interface board outlook



Picture 7: Data rate vs cable lenght

FO MM INTERFACE BOARD

Description

Single, full duplex, multimode, fiber optic port with ST or SMA connectors (see ordering) with both positive or negative logic.

Hardware settings

For proper functioning of that board some settings must be done:

- board address
- optic logic

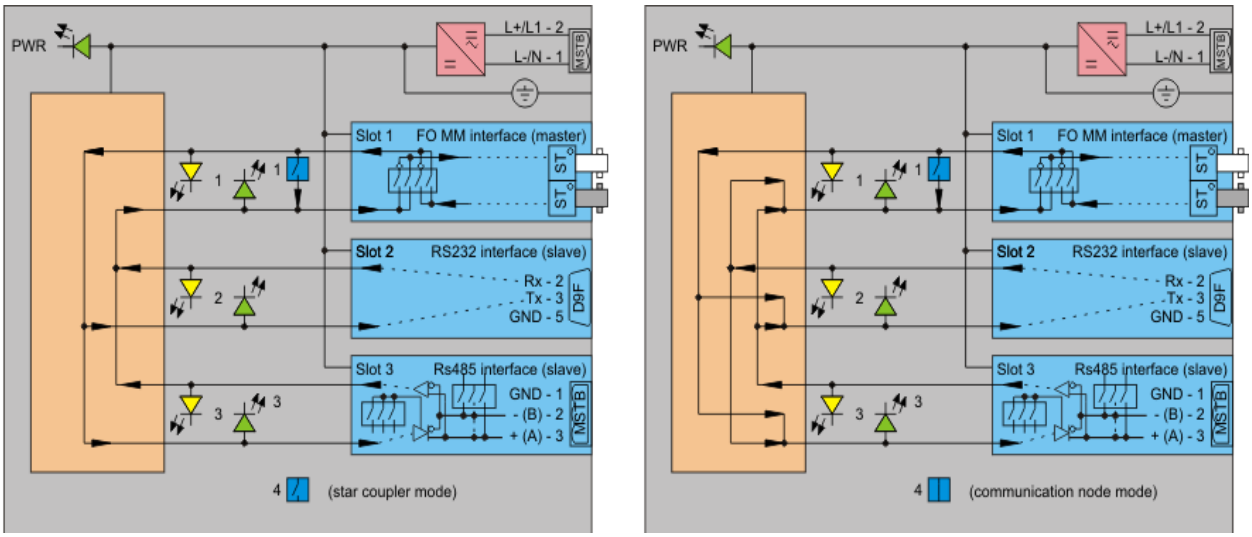
Fiber optic logic

Switch SW1	1	2	3	4
Positive logic	OFF	ON	OFF	ON
Negative logic	ON	OFF	ON	OFF

- Positive logic – light OFF in idle state
- Negative logic – light ON in idle state

It is recommended that positive logic on FO interfaces is used (light OFF in idle state). In other case, if optic loop on one port is broken, communication with other slave port, also will not work.

SCHEMATIC



Picture 8: CMU100/2.6.1.5-2.x and CMU100/2.6.2.5-2.x general diagram

MAINTENANCE

Device is maintenance-free. Do not use liquids for cleaning the unit. Disconnect power supply before cleaning.

TECHNICAL DATA

Power supply			
Input voltage	88-350 V dc		
	70-250 Vac		
Power consumption	88 V dc	26 mA	2.29 W
	250 V dc	9.3 mA	2.32 W
	70 V ac	56 mA	3.92 VA
	250 V ac	21 mA	5.25 VA
Voltage dips	20 ms		
Connector type	„MSTB“ Phoenix 2pin		
Wire crossection	0.75 – 2.5 mm^2		

Communication port RS232	
Type	RS232
Direction	full duplex
Speed	up to 230 k BAUD

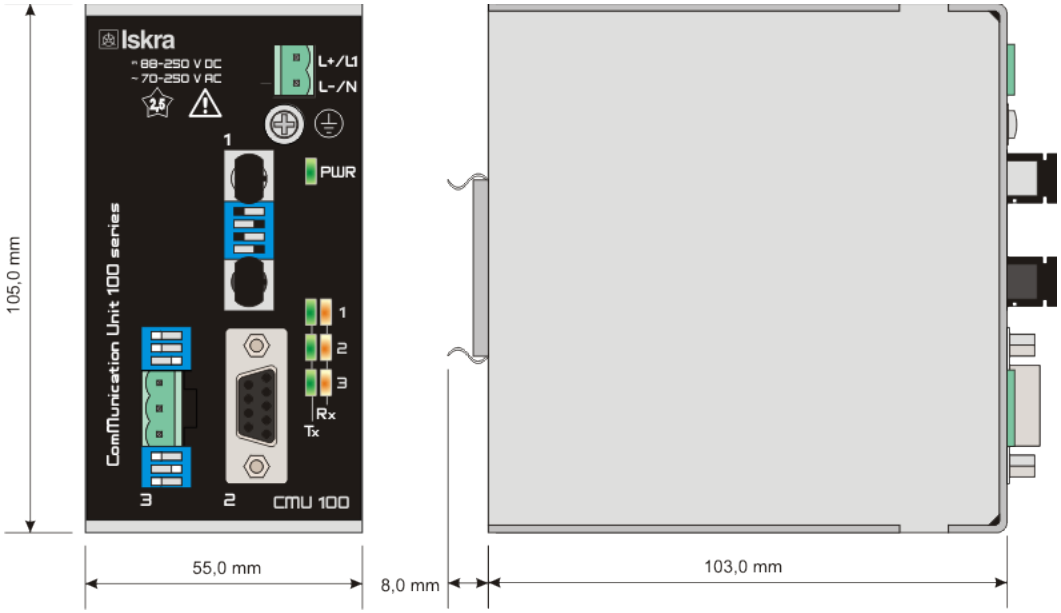
Communication port RS232	
Number of ports	1
Distance	up to 15 m
Isolation	without (GND earthed) or 1000 V DC (see ordering)
Connector type	DB9 female
Lines in	1 (Rx) or 2 (Rx and RTS) (see ordering)
Lines out	1 (Tx) or 2 (Tx and CTS) (see ordering)

Communication port RS485	
Type	RS485
Direction	half duplex
Speed	up to 230 k BAUD
Number of ports	1
Distance	up to 1200 m
Isolation	1000 V DC
Connector type	„MSTB“ Phoenix 3pin
Termination	120 Ohm
Max number of devices on BUS	32

Communication port FO	
Type	multimode fiber optic
Wave lenght	820 nm
Fiber size	50/125 µm, 62.5/125 µm, 100/140 µm, 200 µm
Optical output power	-18 dB
Reciver sensitivity	-24 dB
Direction	full duplex
Speed	up to 230 k BAUD
Input	1 receiver (grey connector)
Output	1 transmitter (white connector)
Logic	light ON or OFF in idle state set by switch (see table)
Echo	can be enabled by switch on main board
Number of ports	1
Distance	up to 500 m
Connector type	ST, SMA, SC, FC (see ordering)

Device			
Weight	0,35 kg		
Dimensions	105 mm	103 mm	55 mm

DIMENSIONS



Picture 9: CMU100/2.6.1.5-2.x and CMU100/2.6.2.5-2.x dimensions

ORDERING CODE

ORDERING NUMBER: CMU100 / MB . I1.I2.I3.I4.I5.I6.I7.I8 - SV . SR

Mother Board + power supply + enclosure:

Power supply: 70-250Vac or 88-250 Vdc

2 ports (without echo)	1
2.....	2
3 or 4 ports	2
5 or 6 ports	2
7 or 8 ports	2

Power supply with additional second (redundant) power supply (in development) (both 70-250Vac or 88-250 Vdc)

2 ports (without echo)	3
2.....	4
3 or 4 ports	4
5 or 6 ports	4
7 or 8 ports	4

Interfaces:

none	0 or leave empty
RS232 nonisolated, Rx & Tx support	1
RS232 isolated, Rx & Tx support	2
RS232 nonisolated, Rx, Tx, CTS & RTS support	3
RS232 isolated, Rx, Tx, CTS & RTS support	4
RS485 isolated, half duplex	5
FO multimode ST	6
FO multimode SMA	7
USB (one virtual com port)	8
Ethernet (one virtual com port, three I/Os).....	9
Digital output	A
Power supervision	B
RS232 nonisolated, Rx & Tx support (special version)...	C

Software Version:

no software (when MB marked as 1 is used)	0
three port star coupler / communication node with echo's	2

Software Revision:

latest software revision	L
write the number of software revision needed (not recommended).....	x

Example: **CMU100 / 2.1.5.6.7.10-2.L** or **CMU100 / 2.1.5.6.7.10.0.0.0-2.L** is

star coupler / communication node with
- single high voltage power supply and
- 5 interfaces with latest software revision:

1. interface is RS232 master port,
2. interface is RS485 slave port,
3. interface is FO with ST connectors slave port,
4. interface is FO with SMA connectors slave port and
5. interface is power supervision.